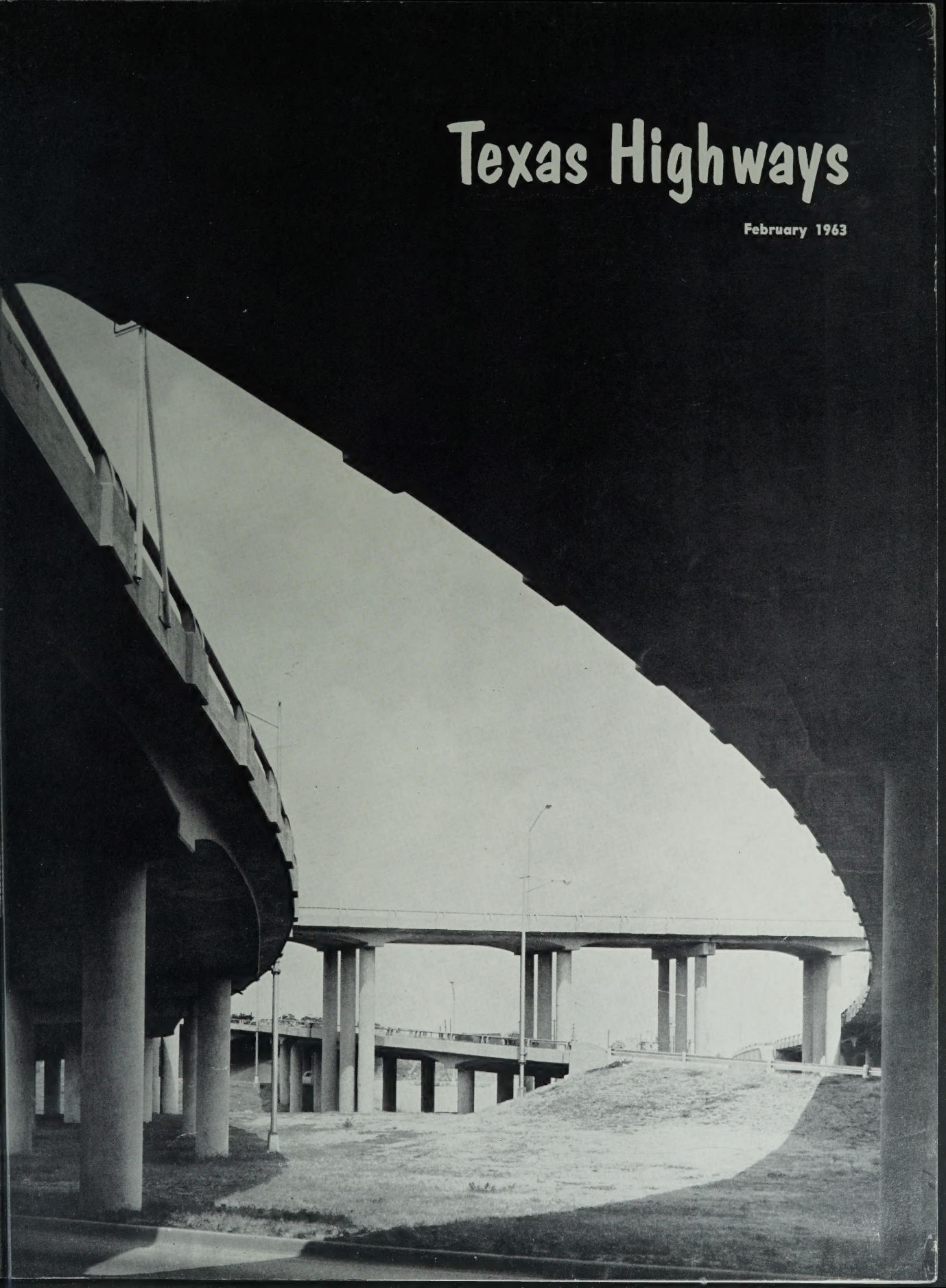
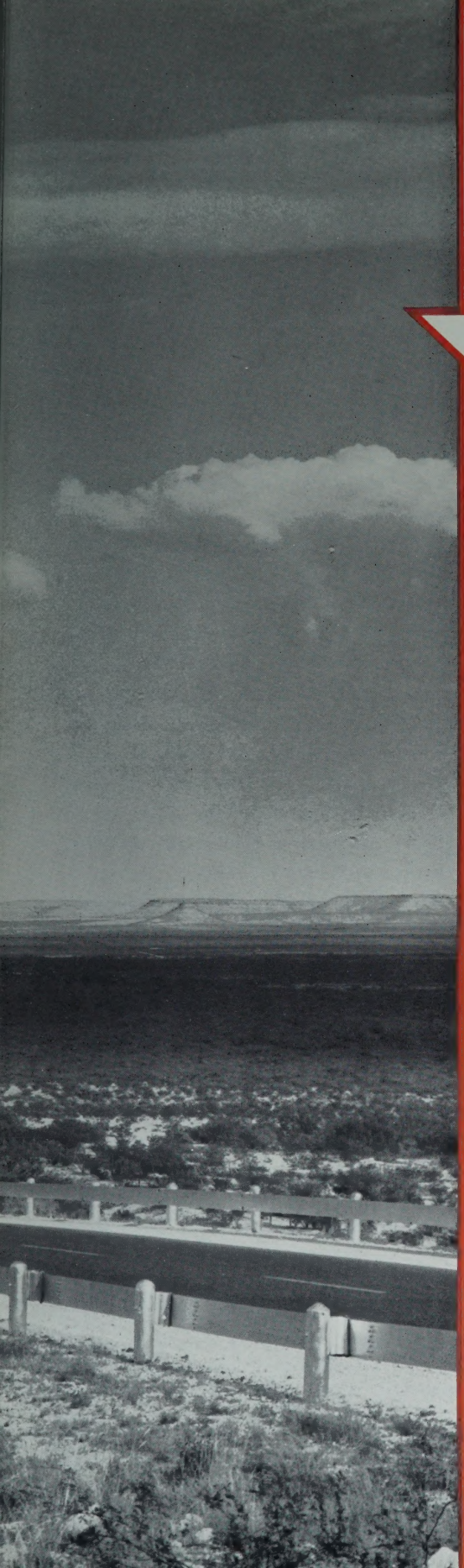
Texas Highways

February 1963





Texas Highways

Volume 10 • Number 2

February 1963

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About Our Cover

Many pictures from many angles have been made of the four level interchange in Fort Worth where Interstate Highway 20 and IH 35W cross. But we believe this month's cover by Willis Albarado adds new depth and dimension to this much-photographed subject, capturing a feeling of sweeping motion not inherent in the usual concrete structure.

Inside Front

It's a long way across them plains, Molly. Motorists traveling this stretch of U. S. Highway 290 near Bakersfield are treated to a panoramic view of wide open sky and prairie that is typically West Texas. The photo was made by Jack Lewis.

Editorial . . . . . .

The three E's of highway safety—engineering, education and enforcement—receive more and more attention as the number of vehicles traveling our streets and highways continues to spiral.

Of the three E's, engineering—in design, construction and maintenance—has proved the best answer to highway safety thus far. Engineering has stood the light of hard, factual statistics. According to the Annual Rating of the National Traffic Safety Inventory for Texas from 1956 through 1961, traffic and highway engineering consistently ranked highest in the three categories, going from 90 per cent in 1956 to 92 per cent in 1962.

In the last eight years, fatal accidents on primary highways have decreased almost 28 per cent. And the important fact is that the primary system carries almost 60 per cent of the total traffic movement in the state. The fatal accident picture for other road segments has not been so bright. Fatalities in cities and towns have increased almost 29 per cent in the last eight years, although city streets carry only 28 per cent of Texas traffic.

Safety-engineered highways and improvement programs undertaken by Texas since World War II are the principal reasons that nearly 5,000 Texans are escaping traffic deaths each year who would otherwise have been doomed if the prewar fatality rate had continued.

To insure this steady decline in the death rate, the Texas Highway Department carries on an extensive program of research, testing, and development in keeping with the growing demands of the population explosion of motor vehicles. The Department employs the latest computers, photogrammetric equipment, nuclear instruments, and research information to build better and safer highways. Highway engineers are constantly seeking ways to improve pavement markings, signs, guard rails, materials, methods and hundreds of other components used in today's highways.

The Department strives through new techniques and design to make it more and more difficult for a driver to have an accident. "Built-in" safety features—many of which even the driver doesn't recognize—are basic features incorporated in the modern highway.

As long as man travels, there will be accidents. There is no sure cure. But safety-engineered highways will continue to be the most effective method in reducing the loss of life and property.

travel map 1963 style

Sizing up the 1963 Official Highway Travel Map is Murlene Gillum of D-16. Murlene is one of the first persons to get a glimpse of the colorful map as thousands roll off the presses in February.

A new U. S. Highway designation —the first one in four years—is shown on the new 1963 Official Highway Travel Map issued this month. The new highway designation is U. S. 259, covering 167 miles of what formerly had been Texas Highway 26 from Nacogdoches through Daingerfield to the Oklahoma border.

Slogan of the colorful map is "Discover Texas — Today's Fun-Tier." Within the year 750,000 or more of these free maps—depicting Texas' highway system and its scenery in striking four-color photographs—will find their way into glove compartments all over the world.

Multilane-divided highway miles now completed and indicated on the new map total 2,187 miles. Included are the completed portions of the seven Interstate and Defense Highways throughout the state.

This year's map has 920 miles of Farm to Market and Ranch to Market road miles added. Now a total of 21,768 miles of the state's 35,000-plus mile Farm to Market road system are shown on the map.

Also shown are the 26,977 miles of Interstate, U. S. and State highways.

Eight new roadside parks, making a total of 854 safety rest areas for travelers, are shown on the new map. One lake has been added: Twin Butte Reservoir in Tom Green County, west of San Angelo. Also, nine new towns are listed.

One highway has been renumbered to avoid confusion with a U. S. highway of the same number. State Highway 259 will henceforth be known as S. H. 42, to distinguish it from the newly designated U. S. 259.

The map plots 1,837 towns and cities. Major routes in the state's 12 largest cities are shown in inset maps. The cities covered include Amarillo, Austin, Beaumont, Corpus Christi, Dallas, El Paso, Fort Worth, Houston, Lubbock, San Antonio, Waco and Wichita Falls.

Texas' attractions are illustrated with 17 colorful photographs of the state's variegated vacationlands. Easy to read and simply marked, the new map shows that highways have been growing along with Texas.

An international handshake between Enrique Humet, Chairman of the Buenos Aires Province Highway Department, and Chester McDowell, right, from the Texas Highway Department, began a month's study of Buenos Aires' highway problems. To the left is Felix J. Lilli, Materials and Research Engineer, who first proposed that McDowell visit his country. During the past two years, Lilli has spent seven weeks visiting the Texas Highway Department. In the center is Jorge M. Lockhart, Chief Planning Engineer of the provincial highway department.

Our Man in Argentina

A caricature of Chester McDowell wearing a Texas 10-gallon hat, drawn on a gold-colored scroll and framed in black, hangs on McDowell's office wall. "In Recognition," reads the plaque inscription, and beneath it are the signatures of the officials of the Provincia de Buenos Aires de Vialidad in Argentina.

McDowell, Supervising Soils Engineer of the Materials and Tests Division at Camp Hubbard in Austin, was presented the plaque as he boarded the plane to fly back to Texas after spending a month studying the highway problems of the Province of Buenos Aires.

The Buenos Aires Highway Department invited McDowell to visit their organization, all expenses paid, to consult with the province's technical engineering staff about pavement construction and design, and materials analysis. McDowell accepted the invitation and made arrangements with his Division head, A. W. Eatman, to take his vacation at that time.

"My wife and I left for South America the last week of October—our first trip out of the States," McDowell recounted. "I felt honored to be making the trip, because until just recently, Argentina has always looked to Europe rather than the United States for highway progress and development.

"But now they realize that no other country can advise them so much in highway construction as the U.S.A."

McDowell—who has been with the Texas Highway Department for 35 years—was the second engineer from a North American highway department to be invited to Argentina, and the first from Texas. (The other highway department engineer was F. N. Hveem of Sacramento, California.)

"One reason I was invited is because the Province of Buenos Aires is very much like Texas climatically and geographically in many areas, especially along the Gulf Coast," McDowell said.

"And another reason was because they are very interested in adopting the Texas Triaxial Tests to help them properly evaluate base and subbase materials."

He explained that triaxial tests are an established testing method with many varied procedures, but that the Texas Highway Department has studied the testing method and modified it to make it more workable by narrowing the process down to one specific procedure.

"Gradually, our method came to be known as the Texas Triaxial Tests," McDowell continued. "Simply, the tests involve the processing of cylindrical specimens in such a way as to be representative of the final conditions of the road bed layers. The cylinders are tested after the proper curing and wetting at various degrees

This plaque—bearing a caricature of Chester McDowell wearing a 10-gallon Texas hat—was presented to McDowell by the Province of Buenos Aires Highway Department staff when the Texan completed a month-long study of the province's highway problems. "I did wear a big hat when we were out in the field," McDowell recalls. "But I don't know which one of the engineers was so artistically inclined."

of lateral confinement, and the results are used in classifying the material so that proper placement in the road bed structure will be achieved.

"This is one result from my work there that we can see right now," he added. "They already have ordered equipment to set up a laboratory to perform Texas Triaxial Tests."

During his month-long stay in Argentina, McDowell said he traveled throughout the province to study 21 road projects, which gave him the opportunity to meet contractors, district highway personnel, construction crews and native people, as well as officials of the province's Vialidad . . . which, translated, means highway department.

"The Province of Buenos Aires is one of the wealthiest and largest states in Argentina," continued McDowell. "It has a population of nearly seven million, and has about 75,000 miles of federal and state roads.

"Only about 15,000 miles of these roads are paved, but when you consider that the province's highway department is only 10 years old, this represents outstanding progress."

McDowell said the operations of the Provincia de Buenos Aires de Vialidad is basically the same as the Texas Highway Department's.

"Of course there are differences, though. For instance, their Directors —comparable to our Commissioners —are selected by the Provincial Legislature from a recommended list presented by the current Board of Directors and the Highway Department staff, whereas our Commissioners are appointed by the Governor," he said.

"Also, their Directors work full time. Working hours are from 6 a.m. to 1 p.m. in the summer, and from noon to 7 p.m. in the winter . . . and there is no break for meals. But they do have coffee breaks."

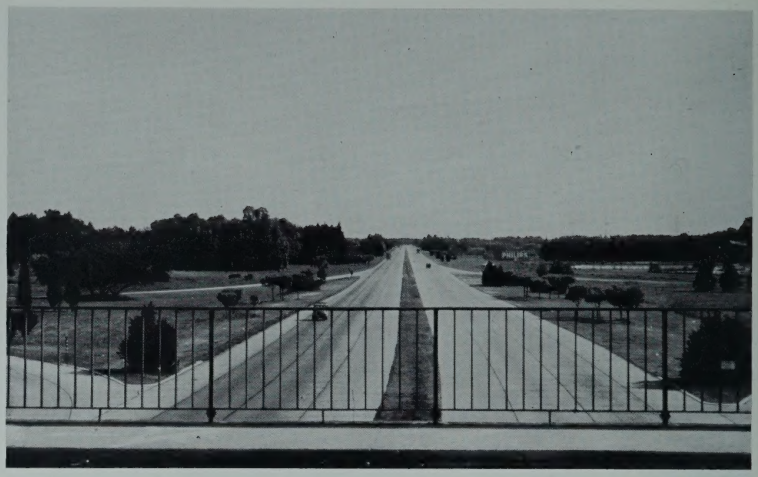
McDowell said that many tractors, pulverizers, rollers, hot-mix plants, asphalt laydown spreaders and other equipment have been imported to speed up and improve construction.

"Much of this equipment is new, but it does break down sometimes, causing terriffic delays because parts have to be ordered from the foreign manufacturers," he said. "The reason for this situation is mainly because the import duties and regulations have put the parts supply houses out of business, and now this cost is being passed right back to the government.

"The cost boomerangs because contract bid items are allowed to increase with inflation, and many times, jobs are not much more than half completed by time the money set up for the project has been spent.

"Under such circumstances, you can

Here on the route to Rauch-Las Flores, McDowell and his hosts inspect a project where select soil is being placed over a soft subgrade soil along a 50-mile section of muddy terrain.



This Buenos Aires expressway stretches through countryside that reminds one of Texas.

imagine how difficult it is for anyone to design and construct a job within a certain time with a fixed budget—and this is why you see many old halfway-completed buildings and road projects in Argentina."

Here McDowell paused to emphasize that despite such problems the Provincia de Buenos Aires de Vialidad is advancing at a rapid rate.

"Their university and provincial laboratories are things of beauty," he said. "It is true that much equipment lies idle, and that sometimes they have difficulty in knowing how to interpret the tests after they have been performed . . . but they are rapidly becoming very technical minded.

"They do about as much testing in the field as we do, although some of their methods may be crude, largely because of the lack of information . . . but there again, this was one of the purposes of my visit there: to help them overcome this problem."

McDowell said that the most important phase of his work there regarded materials analysis. The purpose was to establish a better and more economical utilization of the province's local materials.

After the engineers visited the construction projects, a conference would be held at the central office in La Plata by McDowell and the department staff and project engineers, to discuss the work. The conferences were a time-consuming process that often became complicated because of the language barrier which meant that interpreters had to translate discussions back and forth.

"I faced a diplomatic challenge in trying to criticize their work without being offensive," said McDowell. "I found that they accept criticism most graciously . . . and it's rewarding to have your interpreter turn to you, after what seemed to be a long discussion, and say that they agree with you.

"And incidentally, after several of these conferences, plus our shopping and touring excursions, and trying to talk with our chauffeur—we didn't dare compete with the native drivers—my small Spanish vocabulary increased a good deal."

McDowell stands before a map of the Province of Buenos Aires, whose Highway Department is only 10 years old. During his stay there, McDowell participated in an Asphalt Conference attended by 150 engineers from various South American countries.

At the end of the visit, McDowell compiled a comprehensive report for the Vialidad, with six specific recommendations to be carried out in a long-range program. The report deals mainly with compaction, stabilization, Texas Triaxial Tests, and the securing of base material.

On the homeward-bound journey, the McDowells stopped for a week's visit in Rio de Janeiro, where the Brazilian Highway Department officials met them and took them on a sight-seeing tour of Brazilian scenery and highways. McDowell gave a lecture to them about compaction and pavement design.

The McDowells came home the first of December—from South American springtime to North American wintertime—inspired by a new concept of international understanding . . . and laden with colored slides.

Flashing across the screen, the slides paint the story of an exciting country . . . Petropolis, the ancient city high in the misty green mountains; the Presidential Palace called "The Pink House"; flocks of wild ostriches; cities with a European atmosphere; narrow cobblestone streets and horse-drawn milk wagons loaded with creamery cans; flower markets and sidewalk cafes; fleets of yellow-painted shrimp boats; a bullet-pocked building where former Dictator Peron once hid out; carts stacked with huge loaves of unwrapped bread; a stately opera house where Poe's poem of Annabel Lee was told in ballet; barbecue shops with golden-brown meat cooking over charcoaled wood; a memorial to Christopher Columbus; Spanish architecture and marble-windowed churches; pastoral parks abloom with tropical foliage; banana plantations; white sandy ocean beaches and white frosted waves; and Brazil's new ultra-modern capital city, Brasilia. . . . "It's just like stepping onto the planet of Mars," said McDowell.

McDowell switched off the projector machine and chewed on his cigar, reflectively.

These are the specific recommendations, summing up a detailed report, which Chester McDowell made to the Province of Buenos Aires Highway Department after studying some of their highway problems:

1. **That more lime be used in creating "Working Tables" for proper densification of bases and subbases.**

2. **Develop adequate specifcations to control the quality and purity of lime.**

3. **Replace the present compaction control requirements with those of the Compaction Ratio system. This may be delayed some until the necessary additional laboratory equipment can be supplied to the field personnel.**

4. **In general, discontinue the use of open graded base materials for base or subbase construction.**

5. **Establish and equip a laboratory to perform the Texas Triaxial Tests at the earliest date possible. This is needed especially for proper evaluation of base and subbase materials.**

6. **Give serious consideration to the possibility of producing burned clay aggregates for flexible base and bituminous concrete mixtures.**

WATCH OUT FOR FLYING FREIGHTS

Here a while back, a railroad train dropped onto U. S. Highway 90 not far from Van Horn. Yes, a railroad train. It jumped its track on a T. & N. O. underpass structure and kerplunked, heavily yet without fatalities, to rest in the middle of the highway. The freight's casual presence there was a thorn—indeed, an entire cactus—in the sides of railroad officials, Texas Highway Department personnel, and motorists alike.

But of these, within an hour or so, the least chagrined were the motorists. For Highway Department machinery ground swiftly and with telling effect to offset the inconvenience, if not the onus, of a choo-choo on the right of way.

In rapid-fire sequence, these things transpired: (1) Traffic was detoured at Van Horn, Marfa, and Alpine to avoid the nesting freight cars. (2) Word was flashed throughout the state to apprise west-bound traffic of the train's presence. (3) The railroad was firmly urged to move its train, please, and forthwith complied. (4) Reacting as if it happened everyday, Maintenance Construction Foreman Roy Long moved his crew in swiftly to repair the damage inflicted by the wayward freight.

Within these parentheses is capsuled an unsung operation of the Texas Highway Department, an operation rooted in the disastrous and the offbeat along Texas highways. It is a finely tuned system for assessing hazardous road conditions throughout the far-flung Texas highway network, and taking steps to spread the word when highway conditions are other than normal for the protection of the traveling public.

Heart of the system is an Austin office of the Department's Travel and Information Division. Its main arteries are teletype lines connecting 25 district offices with the Main Office in the Capital City. Designated reporters—usually the District Maintenance Engineer—in each of the districts are charged with the responsibility of pulsing immediately to Austin any information on extraordinary highway conditions.

Adrenalin for the system, the force which most often triggers its speedy response, is usually the weather. Flood, ice, and snow are generally the elements closing a highway, or at the least necessitating a warning to travelers to be wary.

Thus last month when an ice storm slashed through 13 highway districts in southeast Texas, 13 road condition reporters hastily checked conditions, quickly forwarded their reports to A. D. Morgan Jr. at D-16.

By 9 a.m. all districts had reported by teletype and telephone. In this instance most reports were "negative." That is to say, roads were open despite the ice. Many had been sanded, some salted, and caution was advised. And one high bridge at Beaumont was closed to truck traffic. But by and large the emergency didn't cause much of a ruckus—nowhere near so bad as many floods and blizzards have,

The engineer was the ultimate litterbug when he inadvertently dropped his freight train on U.S. 90 near Van Horn. The mishap set in motion the Department's unique machinery for warning travelers about unusual road conditions they might encounter along their routes. Nobody was hurt in the accident.

or as Hurricane Carla did, or as did at least one precipitous freight train.

Nevertheless, at "Road Condition Central" in Austin, personnel were galvanized into action. Folk who travel are quite as interested when road conditions are normal, or relatively so, in a time of potential emergency, as they are when roads are impassable. So it was now the job, and a most vital one at that, of the Travel and Information Division to relay the 13 reporters' tidings as quickly as possible to the traveling public.

Morgan rapidly snythesized his 13 reports into a single press release detailing where highways were iced over and sanded, when the ice was expected to clear, and the intelligence that the Port Arthur-Orange high bridge on State Highway 87 was closed to trucks.

Now Morgan telephoned news correspondents of Associated press and United Press-International, so they could flash his report to the front pages of noon edition newspapers across the state. And so broadcasters could put his message on the air immediately. He telephoned the same information to police agencies and oil company travel services so that travelers could be advised about specific conditions on request.

Other travelers got the word that day through the Department's eight

Hazardous driving conditions. Blocked highway. Bridge out. Roads under water. Train on the highway. Forest fire. Such road condition reports are relayed day or night to A. D. Morgan from districts throughout the state. Night or day, weekend or holiday, Morgan stands ready to flash road conditions to the traveling public.

A washed-out bridge, ice on the highway, an overturned truck loaded with volatile missile fuel—anything can happen on Texas highways, endangering or inconveniencing the public. When it does, the Department gets the word to those who travel. This washout occurred on U.S. 285, south of Oria in District 24. A temporary detour was constructed and, ironically, it washed out, too.

Tourist Bureaus at state lines, via four phone calls relayed from Morgan's phone calls to Gainesville, Waskom, Laredo and Anthony. What's more, all divisions in Austin got his report that morning, and so did all district offices, by teletype.

Within two hours after the working day started, the press, the public, and the Highway Department were all thoroughly cognizant of road conditions across Texas.

"Unless we go to skywriting," says Morgan, "I don't see how we could perfect a better network for informing the traveling public and our own people of unusual highway conditions."

Inasmuch as his routine was once shattered by a falling train, Morgan may be forgiven his celestial reference. He wouldn't be particularly surprised, in fact, if an airplane—or, for that matter, a meteorite or off-course missile—should plump onto a Texas highway, necessitating rerouting and the concomitant informing of those who travel. "I'd simply wait for word from one of our reporters in the field," he says. "Then I'd start dialing my phone."

Morgan does not hesitate to credit the success of the road condition reporting system to the 25 district Road Condition Reporters and their alternates.

"They have a sense of mission about this," he says. "They realize the real need for making sure travelers are informed when something along their route might delay or endanger them." (See box for listing of Road Condition Reporters over the state.)

While road condition reports are applied most dramatically in emergency situations, they also serve a longer-term usefulness. Monthly they, with reporters' supplementary information, are compiled into a Road Condition Bulletin depicting general road conditions over the state. Widely distributed (nearly 1,000 free subscribers), the Bulletins are invaluable references for commercial firms, travel organizations, Department personnel, and other state agencies.

Still, the fun and excitement of road condition reporting and broad-

"It is a finely tuned system . . ."

"Hmmm heres D-16's road condition report for today, 'all highways reported free of ice and snow throughout the state. Traffic normal. Clear skys and tropical temperatures prevailing."

casting rests incontestably in those sudden episodes which throw Morgan's office into a sort of controlled panic. He and his people are on call at all hours, on weekends and holidays as well, and they've come to anticipate the unexpected. Not long ago, for instance, Morgan was awakened from a sound sleep with a report of icy road conditions on U. S. Highway 290 near Austin. "It couldn't be," said Morgan, "there's no precipitation." But it was. A water main had burst and frozen on a narrow swath of 290. It was a definite hazard. He called the District Maintenance and Construction Foreman, was assured the strip would be sanded forthwith, and went back to sleep.

Anything can happen along Texas highways, Morgan says, "and the trouble is that it so often does." Fairly routine are reports like this from West Texas: "Roads have been closed because of dust storms. Visibility reduced to zero."

Not so routine was the report that a West Texas highway had been closed because of oxygen. "Oh, come off it," Morgan said in a follow-up call to his district reporter, "there's oxygen everywhere."

"Not liquid oxygen," punchlined his reporter. "It could spill from a wrecked tank truck onto the road. Could explode." The highway stayed closed until the wreck was cleared.

Highways even catch fire occasionaly. Spillover from an oil gusher once occasioned such a report about a highway in East Texas. Highways are closed fairly frequently for such reasons as the threat of a prairie fire or, in one case Morgan recalls, a forest fire. And danger of asphyxiation along a highway near a blown out gas well not far from Monahans once necessitated a detour and the attendant gearing-up of D-16's emergency road condition reporting setup.

Nature in its violence remains the system's biggest bugaboo, but ours is an age of flying freight trains, as well. "We've learned to live with the unexpected," Morgan says. "It keeps us on our toes."

OUR ROAD CONDITION REPORTERS

The Safety of the Traveling Public Is in Their Hands

Joe M. McDowell
Supervising Maintenance Engineer, Paris . . . . . District 1

J. P. Cooper
District Designing Engineer, Fort Worth . . . . . District 2

Frank L. Ragland
Supervising Maintenance Engineer, Wichita Falls . . . . . District 3

James M. Harris
Supervising Maintenance Engineer, Amarillo . . . . . District 4

Joel D. Willson
Maintenance Construction Superintendent, Lubbock . . . District 5

Harry S. Wallace
Maintenance Construction Superintendent, Odessa . . . . District 6

Robert N. Jennings
District Maintenance Engineer, San Angelo . . . . . District 7

George M. Williams
Maintenance Construction Supervisor I, Abilene . . . . . District 8

George G. Cleveland
Senior Maintenance Engineer, Waco . . . . . District 9

Isaac H. Crutcher Jr.
Supervising Maintenance Engineer, Tyler . . . . . District 10

William L. Stockton
District Administrative Engineer, Lufkin . . . . . District 11

James H. Doss
Maintenance Construction Superintendent, Houston . . . District 12

Earl F. Wyatt
Supervising Maintenance Engineer, Yoakum . . . . . District 13

Damon D. Naumann
Engineering Aide IV, Austin . . . . . District 14

Bertin E. Leveque
Clerical Supervisor IV, San Antonio . . . . . District 15

Herman Schneeman Jr.
District Maintenance Engineer, Corpus Christi . . . . . District 16

Robert H. Schleider Jr.
Supervising Maintenance Engineer, Bryan . . . . . District 17

Grover Green
District Maintenance Engineer, Dallas . . . . . District 18

Roy C. Johnston
Maintenance Construction Superintendent, Atlanta . . . District 19

Cleveland H. Brown
District Maintenance Engineer, Beaumont . . . . . District 20

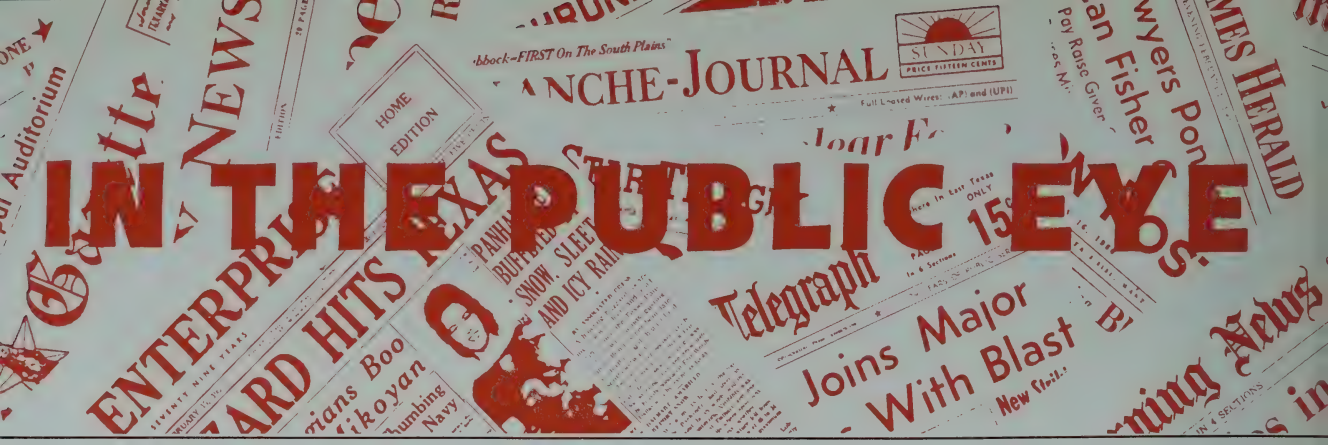
Tracey L. Haliburton
Maintenance Construction Superintendent, Pharr . . . . District 21

Edward L. Sanders Jr.
Assistant District Engineer, Del Rio . . . . . District 22

William T. Moore
Assistant Fiscal Officer, Brownwood . . . . . District 23

Leroy J. Wallen
Supervising Maintenance Engineer, El Paso . . . . . District 24

Joseph R. Long
Maintenance Construction Superintendent, Childress . . District 25



"STOP?" "HALT?" "WHOA?"

Austin Times Herald, datelined Washington (NANA)—"The Federal Government is pushing a drive to end the confusion over conflicting, contradictory traffic signs around the country.

"National uniformity of signs, signals and markings will help cut down the country's traffic death and injury rate, according to Federal Highway Administrator Rex M. Whitton.

"He points out that obscure, misleading or illegible signs cause many accidents. Others result from a lack of signs where they ought to be 'or a sign that means one thing in one jurisdiction but something else only 50 or 100 miles away.'

" 'Make no mistake,' he said, 'Uniformity of traffic control devices is important to highway safety.' "

MEANWHILE . . .

Abilene Reporter-News—quoting other viewpoints from the Houston Post—"The paving of Texas' farflung system of highways is steadily progressing, notably in the development of the interstate system. . . .

"Transportation is the great, ballooning problem of the century, in Texas as in the nation generally. It was really just beginning half a century ago, when enough people were getting horseless carriages to warrant the construction of good roads on which to drive them. . . .

When Texas' present population is doubled, as it doubtless will before the end of the century, and there are twice as many motor vehicles as the present 4.5 million, where shall we put them? . . .

"Good roads are an absolute essential in this age. Whatever the reasonable cost, they are worth it. And the more our highway development keeps pace with the traffic demands, the better it will be for everybody."

THE SPEED BARRIER

Ochiltree County Herald, editorially—"One of the things the Texas Legislature is going to consider in this session is the raising of the speed limit on Texas highways from 60 to 70 miles an hour.

"While it can be argued that 60 is a safer speed than 70, as a practical matter, very few people drive 60 any more . . . you are liable to get run over if you drive 60 miles an hour.

"We think a 70 mile speed limit would be reasonable for Texas. After all, we ought to have a speed limit that will be observed. The 60 mile limit certainly isn't today."

LASS ON AN OVERPASS

Big Spring Herald, acknowledging loop at Colorado City—"Janie Lee, the pretty homecoming queen of Colorado City High School, stood in a crisp breeze atop an overpass and snipped a red and black ribbon at 10:20 a.m. today to symbolize the opening of the IS 20 (Interstate Highway 20) bypass loop here. . . .

"J. C. Roberts, district highway engineer of Abilene, said 'the opening of the loop here today leaves only the Big Spring loop and the improvement of the road in Callahan County for completion of the route through the 148 miles of the district. . . .'

"He commended Colorado City on planning for a lighting system surrounding the entrances and exits to the route."

ALL THE WAY

San Angelo Standard-Times, in promoting good will—"The Inter-American Highway is now completed and open from Texas to the Panama Canal.

"The avenues of communication make for understanding. Texans and the citizens of our neighbors to the south should develop a better understanding by reason of this road. The open road to adventure has now become the highway to better international relations. It will mean more trade, more tourism, and better international relations."

LOOK OUT FOR THE CARS

Winkler County News, reporting—"Installation of a railroad crossing signal at the intersection of Texas Highway 302 and the Texas-New Mexico Railroad line in Winkler County has been given approval by the State Highway Department.

"Archie Sherrod, district highway engineer from Odessa, said approval for the installation was made by highway department officials at Austin earlier in the week. The engineer said negotiations for erecting the unit are now under way between the railroad and the highway department. He reported that it probably will be a few months before the signal is in place."

TO THE FUN-TIER

El Paso Herald Post, on scenic highway proposal—"County Planning Board Chairman Don Fertel yesterday told the board that the proposed Trans-Mountain Road connecting Canutillo and Dyer street would give access to the 'most wonderful recreational facility in the County.' . . .

"County Right of Way Counsel Tom Diamond said that the Trans-Mountain Road would in no way impede progress on Interstate 10. . . .

"Right of way purchases through the mountain range await completion of an aerial survey."

THE TIE THAT BINDS

Houston Post, datelined Angleton—"The Texas Highway Department's plans for Farm Road 1561, which will connect Brazoria and Galveston Counties, are nearing completion and will include a bridge almost a half-mile long over Chocolate Bayou.

". . . right of way plans and legal instruments are now being submitted within the next few weeks to the Brazoria County Commissioners Court for approval. Once the plans are approved, the purchase of right of way will begin.

"The first contract on the long-awaited 'Hitchcock Road' is expected to be let early next summer. . . ."

GET OUT OF TOWN

Denton Record-Chronicle, covering a speech given by Denton County Judge W. K. Baldridge—"Who says you're endangering your life if you spend a holiday weekend on Texas Highways? It just isn't so. . . .

". . . . on a busy weekend, if actual statistics are any indication . . . you'd be far safer on a state highway than you would be if you stayed within the so-called safe limits of your city.

"Who deserves credit for highway safety? . . . The credit must go to the engineering phase of highway construction.

"City streets in most areas are still being built in haphazard fashion. . . ."

ONLY ONE OF MANY

Wichita Falls Times, reporting—"Improvement of Farm Road 369 by making it a divided four-lane traffic thoroughfare between Lake Road and Fairway has been authorized by the Texas Highway Department at an estimated cost of nearly half a million dollars, including tripling the width of the Holliday Creek bridge which is not in this segment of the road.

"What makes this relatively big project stand out is that it is only one of many construction jobs which have recently involved Farm Road 369."

ROLL ON, O FREEWAYS

Fort Worth Star Telegram, with an eye on the Tarrant County budget—"About one-third of the 1963 county budget pie will go to the highway right of way fund as freeways roll from the center of Tarrant toward its distant bounds.

"In the last five years, a total of $9,363,141 has been spent buying right of way in Tarrant . . . the peak year was 1961 when $3,258,454 was spent on the program.

". . . 1963 expenditures will approach the peak with the Belknap and Poly freeways pushing farther out."

HANDS DOWN

Brazosport Facts, in a straightforward editorial—"When the Brazosport Area Planning Commission first undertook its biggest project—the industrial loop road about Brazosport—all members agreed on one important point of action: Determine the right-of-way as quickly as possible and acquire the land. It would never be cheaper. . . .

"But for the urban complex the planner envisioned, far more roads will be needed, particularly the proposed freeway between Brazosport and Houston, and further development of the now-authorized east-west road between Brazosport and Hitchcock. . . .

"Our recreation holds a greater natural attraction for Houston people than Houston's business holds for our people. As access and facilities improve, this will increase. And we will find that convenience of travel will stimulate more traffic southward than northward."

MOVING ALONG

Dallas Morning News, in a UPI story datelined Austin—"Highway construction moved along at a rapid but not record pace in Texas during 1962, with the sprawling interstate system and unique bridge projects highlighting the year for the Texas Highway Department.

"Assistant Highway Engineer J. C. Dingwall said bridge projects presented the department with some challenging design problems in 1962.

"More than 400 bridges were built or were in the process of construction. Work ranged from little crossings over creek beds and arroyos to tricky causeway construction on the Gulf Coast and curving freeway projects."

ACCELERATION

Burkburnett Star, announcing—"A stepped-up construction schedule, calling for an additional $3,500,000 for development of the Red River Valley Expressway has been ordered by the Texas Highway Commission.

"Changes in plans were made in order to have the expressway (U.S. 277 and U.S. 281) ready in time to join with the Southwestern Turnpike in Oklahoma. The state commission said the completion of the Oklahoma segment of this artery may be accomplished by the summer of 1964."

ANCHORS AWEIGH

Galveston County News, announcing—"Plans for the boat ramp to be built by the Texas Highway Department adjacent to the Highway 3 bridge over Dickinson Bayou have been announced.

"The Highway Department proposes to construct two piers and a boat ramp at the above location. A 30 by 40-foot concrete boat ramp would be constructed with the 40-foot length normal to the bank and centered 62 feet downstream from the centerline of the Highway 3 bridge."

TO PLEASE A LAKE

On a clear crisp day in early December a smiling man stepped to the middle of the roadway on the west end of the Big Sandy Creek Bridge near Breckenridge, spoke a few well chosen words, cut the narrow, bright green ribbon with a pair of small scissors, and the brief ceremony was over.

The time it took to dedicate the new bridge somehow seemed insignificant. Indeed, to the Highway Department men present who had spent long months in planning and designing the five bridges and six miles of highway in the project, the brief period must have been an anticlimax. To Senior Resident Engineer Johny Brannan and his staff, the men directly responsible for the project, it must have seemed they had no more than taken their places behind the ribbon before the affair was over.

Others had traveled long distances to celebrate the occasion. U. S. Highway 180 Association members had come from as far away as Arizona and New Mexico to join with chamber of commerce officials from the surrounding cities and with Highway Department personnel.

Marvin Naylor, chairman of the Breckenridge Chamber of Commerce Highway Committee, had the honor of snipping the ribbon which officially dedicated the bridge-and-highway relocation project across the new Hubbard Creek Lake.

The real celebration came shortly afterward at the Breckenridge Country Club where Highway Commission member Hal Woodward told celebrants the

Highway and bridges had to be relocated recently on U. S. Highway 180 near Breckenridge with completion of the dam on the Hubbard Creek Lake. Highway on the right and most of the land in the picture will be inundated as the lake begins to fill.

And another bridge is officially opened. Marvin Naylor, chairman of the Breckenridge Chamber of Commerce Highway Committee, dedicates the Big Sandy Creek Bridge four miles west of Breckenridge. Senior Resident Engineer Johny Brannan (just to right of Naylor) and his staff watch intently during the ceremony.

relocation project was the finest example of democracy in action. There were other Highway Department personnel present, including District Engineer E. M. Pritchard of Brownwood, in whose district the new bridges were built; District Engineer R. W. Crook, Fort Worth; District Engineer Jake Roberts, Abilene; and, of course, Senior Resident Engineer Johny Brannan and his staff.

The newly christened bridge is one of five which will span one arm of the new lake.

"It's the biggest single project we've ever had in District 23," Brannan said. "It's also the biggest bridge I've built in 15 years as resident engineer at Breckenridge."

Hubbard Creek Lake, which will inundate the middle of the Stephens

Senior Resident Engineer Johny Brannan (left) and J. B. Crutchfield, Engineering Aide IV, inspect concrete work near Bent 92 on the east end of the Big Sandy Creek Bridge.

Gradall levels riprap along U. S. Highway 180 to prevent erosion from rising waters in the new Hubbard Creek Lake.

Neatly laid limestone riprap outlines the west end of the Big Sandy Creek Bridge, the biggest bridge ever built in Stephens County.

County Regular oil field, will have a surface area in excess of 16,000 acres at spillway level. The twisting shoreline will wind 125 miles through the West Texas hills. The West Central Texas Municipal Water District, formed to supply water for Abilene, Breckenridge, Albany, and Anson, built the dam and provided $700,000 for raising U. S. 180 above the expected water level and furnished right of way free to the state. Total estimated cost of the relocation of highway and building new bridges came to $1,728,900, including engineering costs.

Inundation of the old highway called for many hours of negotiation between District Engineer Pritchard, other Highway Department personnel, and the Water District. Engineers from Highway Design Division and the Bridge Division in Austin, as well as Brannan and his staff, spent long months studying the complex highway problems brought about by the proposed lake. One of the problems discussed was whether to skirt the lake or to build across it.

"We decided to build the highway across the lake," Brannan said, "rather than skirt it because of the scenic attraction, and because it would be cheaper in the long run for the traveling public and for our maintenance forces. We also added 1,500 feet to the Big Sandy Creek Bridge when we found out fill would cost more than the same amount of bridge." The bridge is 3,751 feet long with a 30-foot roadway. At the Big Sandy Creek area the roadway will be 65 feet from the lake bottom and on the west end it will be 25 feet above the bottom.

Limits of the project are from a half mile west of the Stephens-Shackelford County line to a point four miles west of Breckenridge, a distance of 7.3 miles. Almost a mile of that distance is composed of bridge structures.

"There was one unique feature the contractor used in building the Big Sandy Creek Bridge," Brannan said. "After the bents were constructed, the contractor erected 12-inch H-beam rails on the tie beams below the caps so he could remove and transport half the pan forms to the next point without having to disassemble each one. Each section of the forms was lowered to a mobile platform and moved to the new location. Special built mobile platforms were used for spraying curing compound on the slab bottoms and for patching bents and slabs.

"The contractor also was given permission to vary the procedure and methods of finishing the bridge surface to eliminate hair-cracking, which is usually very bad in this area," Bran-

nan added. "The concrete was vibrated in longitudinal sections, approximately leveled and then screeded until there was a uniform surface. Then the surface was worked to a smooth finish with a 10-foot straight edge and hand floats from a bridge over the slab. Instead of belt finishing, the slabs were broomed lightly with a heavy push broom, after hand floating and before the finish had set. This method left a rough-grained finish."

A special specification, "Stone Protection," was used on slopes to prevent erosion from the lapping lake waters. Dumped riprap was crushed at the quarry, stockpiled, and later hauled to the project site. Bedding material of crushed gravel was spread over the slopes by a crawler type tractor with a front end loader. Gradalls operating from the crown of the road and the toe of the slope completed the operation by working the riprap to neat lines, filling in low places and removing high spots. Practically no hand work was needed in placing the riprap.

Construction of the Big Sandy Creek Bridge was not achieved without its moment of humorous suspense.

One day after the bents had been erected, Inspector Stanley Davis rode a dragline to the top of a 65-foot bent to survey levels for setting steel shoes. As the dragline was swinging clear, a gust of that West Texas wind caught it from the side and the long steel boom fell with a whoosh, narrowly missing Davis.

"You could see the claw marks on top of that bent where ole Stanley was digging in," Brannan laughed. "It didn't hurt him any, just caused him a lot of discomfort. He had to go without his lunch and he ran out of cigarettes. It was seven hours later before we got him down, but Stanley finished setting the elevations."

Contract for the relocation project was awarded to the H. B. Zachry Company of San Antonio and work began in September 1961. By November 1962, the new U. S. Highway 180 was opened to traffic. Road construction includes a 12-inch gravel subbase and 12 inches of crushed limestone with 1.5 per cent lime. The 26-foot pavement has a two-course surface treatment with eight and 10-foot paved shoulders.

It took the Zachry Company slightly more than one year to complete the project once work got underway. But the start of planning for highway relocation started in 1955 when the Texas Legislature created the Water District. An election was held in 1959 by the four cities approving tax bonds for construction of a dam on Hubbard Creek. During this time, consultations were carried on between members of the Water Commission, the Water District, the Texas Highway Department, and the cities and counties involved.

It has been a long time since relocation of U. S. Highway 180 was first discussed. It has been a long time since Resident Engineer Brannan and members of his residency first began to lay out schematics and preliminary designs for the big project. The dedication ceremony was over in perhaps five minutes, but that is not the end. It is only the beginning. For many years motorists will enjoy what took so many years in the making.

Stephens County Residency—Breckenridge

Personnel who worked directly with the U. S. Highway 180 Relocation Project

Engineering

J. B. Brannan, Senior Resident Engineer	Supervision
Don F. Chrisman, Draftsman I	Laboratory and office work

Bridge Inspection

J. B. Crutchfield	Engineering Aide IV
Stanley C. Davis	Inspector II
Michael Lisenbee	Engineering Aide I
Robert L. Harris	Engineering Aide I
Terrell L. Cook	Engineering Aide I
William E. Adams	Engineering Assistant II

Roadway Inspection

Billy J. Fry	Inspector III
Seburn H. Wolfe	Inspector II
Edgar L. Price	Engineering Aide I
Leon W. Greenlee	Laborer

CRITICAL PATH SCHEDULING

The following paper was presented to a recent Resident Engineers meeting in Beaumont, District 20. The method discussed here was responsible for getting the Polaris missile program off the ground. Application of the process appears to be unlimited.

Jack D. Hedge, Senior Resident Engineer
Silsbee, District 20

The critical path method of scheduling is a fairly recent development which is rapidly gaining acceptance, or at least attention, as a management control technique. It was first developed at Du Pont about six years ago.

It is presently being used by some large contractors, consulting engineers, state highway departments, and several federal agencies, including B.P.R., N.A.S.A., Navy Bureau of Yards and Docks and the Army Ballistic Missile Agency.

C P M is based on the premise that if all the activities which must be accomplished to complete a specific project are known and if the times that are required to do each job may be estimated, then these activities can be shown in their logical relationship in a diagram from which the duration of the project and the particular activities controlling its completion within this time period can be determined. This diagram will show the longest completion time for a project by summing the series of activities which must be in sequence and finding the series which has the longest estimated time for completion. This series of activities is called the Critical Path. Shortening completion times of activities on the critical path will shorten the project time, while speeding jobs not on the critical path will not shorten the project.

The next few remarks will be in regard to an example construction project, even though the technique is applicable to preparation of P.S. & E., acquisition of right of way, or all three together.

The first step in making this diagram is to make a list of the activities or tasks which must be done to complete the job. Arrange the list in the logical order in which the activities are to be done, including all restraints such as issuance of work orders, closed asphalt seasons, minimum curing times, etc. Figure 1 shows such a list for a bridge project, simplified for purposes of illustration.

The second step is to draw the diagram with the listed activities arranged to show their sequential relationships (Figure 2). To do this for each activity, you decide which activity must immediately precede it, immediately follow it, and those which may be carried on concurrently. This is done by inspection based on experience and the specific situation and will enable you to place each activity in its proper place in the diagram.

In the diagram each activity is represented by an arrow. The arrows are joined in such a way as to show the sequence in which the activities are to be done. The tail of the arrow is the beginning of the activity and the head is the finish. The circle where two or more arrows join is an event. An event is simply a point in time, marking the beginning or end or one or more activities. Another way to think of an event is that it is the point where the successful completion of all preceding activities permits the beginning of following activities. For instance, Event 7 shows that you may begin building footings (which is Activity 7-8) only after all of the activities leading into that junction have been completed; such as excavation for footings, driving piling, procuring reinforcing steel, etc. The length of the arrows and their angular position have no significance. Their directions from tail to head show the flow of the work. It's desirable to actually describe the activity briefly on the diagram rather than code them. Coding makes it more difficult for the user to visualize the work as he examines the diagram. The completed diagram is a master plan for completing the project and may be the basis for both scheduling the work and for control as the work proceeds.

The third step is the estimate of time required to accomplish each activity. Events, the circles, are points in time and in themselves do not consume time. Activities represent work necessary to go from one event to another and, therefore, require an expenditure of time. Each arrow must have a time value with one exception (Figure 3). The exception occurs when an arrow is used simply to show that one particular event must be reached before another event, with no time-consuming activity involved. Arrow 17-18 is such a case. This plan assumes that both approach fills must be completed before beginning the approach slabs. These arrows are called "Dummies."

Having assigned a time requirement to each activity, the path through the diagram which gives the longest total time can be determined. This is the critical path (Figure 4). This path establishes the duration of the project as planned. It is called the critical path since the activities which comprise it control the completion time. The only way in which the time required to complete the project can be decreased is by shortening the time for doing one or more of the activities on the critical path. Expediting activities which are not on the critical path would have no effect on the duration of the project. The time required to reach an event on the critical path is found by summing critical activity times from the point of beginning; for example, it takes 35 days to reach Event 7.

The amount of time to get to each event on non-critical paths is determined the same way—by summing non-critical activities times from the point of beginning. Since there is more time available than is needed for the accomplishment of non-critical

ACTIVITIES (steel stringer bridge)

issue work order
move in
erect barricades
procure reinf stl
clrg & grbg
drive piling
exc footings
build footings
" int cols
" so hdr bank
" no " "
" so abt cap & cols
" no " " " "
cure so " " " "
" no " " " "
erect stl stringers
bld so appr fill
bld no appr fill
bld slabs
channel work
brg rail
appr slabs
guard rail
seed slopes
clean up
final insp

Figure 1

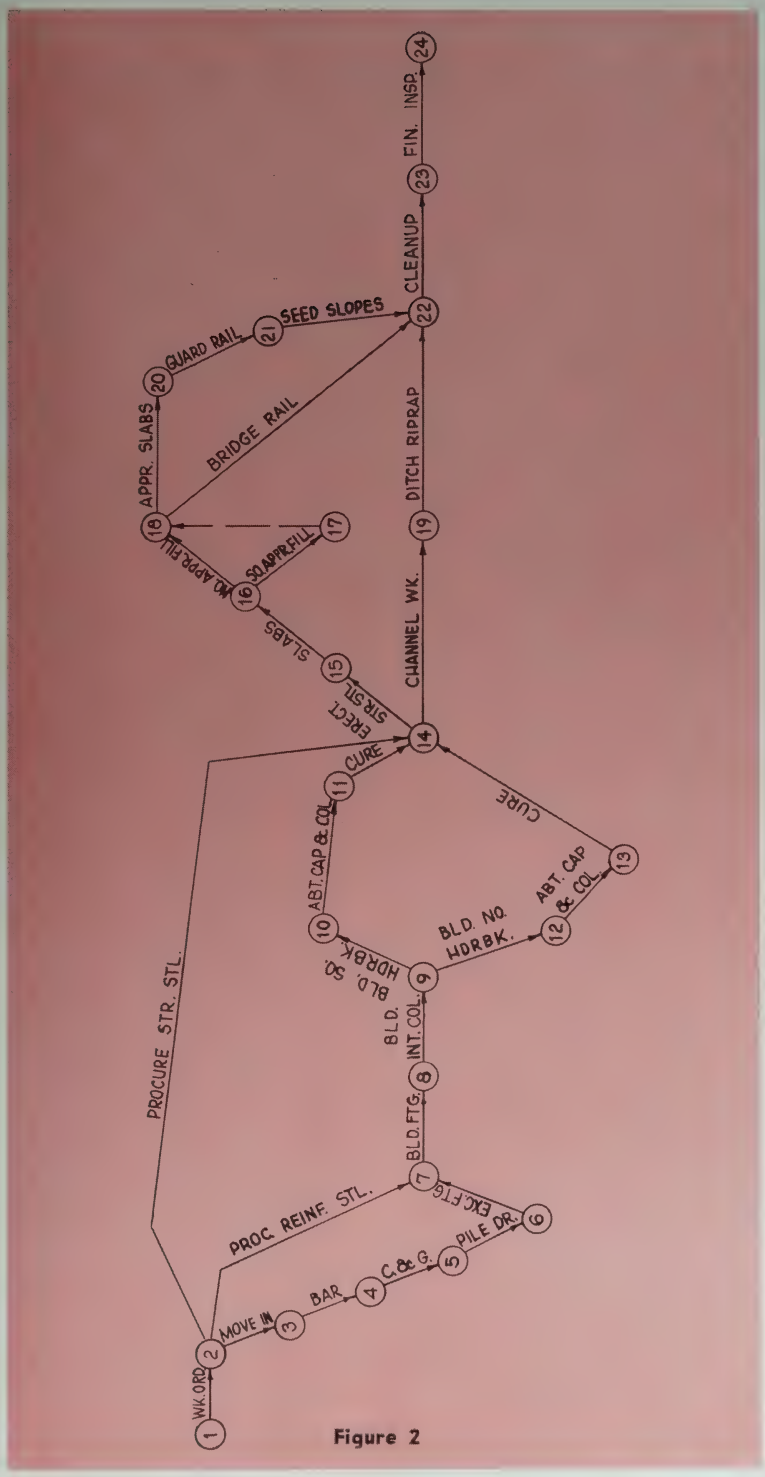


Figure 2

activities, there is a range of time during which non-critical events may be reached; for example, the earliest time at which Event 6 could be reached is 30 days (the sum of the preceding activities).

However, since 35 days are required to clear Event 7 for beginning succeeding activities and since only three days are required to do Activity 6-7, Event 6 could be reached as late as 32 days from the beginning and still not slow up the job. The range of time during which Event 6 can be reached extends from the earliest time of 30 days to the latest time of 32 days. This freedom or leeway of two days is called total float time. Another way to think of total float time is that it's the time any task can be delayed before it will affect the project completion time.

It should be realized that how float time is absorbed may place items on the critical path, which were not previously critical. By definition, activities on the critical path have zero float time. There is no leeway in the time to accomplish the critical activities.

We should remember that the duration of the project and its critical path diagram can be changed by varying the plan for its accomplishment. This would be a change in the basis on which the time estimates and sequences were determined. So any change in the assumed plan will change the diagram. When this happens, the times and sequences should be re-examined and a new diagram prepared. This is one of the advantages of this procedure. Various plans for doing the job can be tested to arrive at the best plan with respect to time or cost or available resources, or any combination of the three.

In estimating the time required for an activity for which we have no experience figures, it is usual to use the weighted average of three values; the most optimistic, the most pessimistic, and the most likely. Experience figures and production rates are used, of course, when available. In Figure 4, if the total estimated time for com-

pletion of 114 days is too long for whatever reason, the project duration can be cut by shortening the time required to do those activities which lie on the critical path only.

One application of this procedure might be in determining the number of contract days to allow on a project. By preparing a critical path diagram using the sequence and times required which seem most likely, the shortest time in which a contractor could finish the project can be determined. The contract working time could then be set somewhere above this figure. Of course, some factor of safety should be included.

Another application might be in assessing the actual effect of large field changes and work orders on the contractor's working time for projects under construction. We now generally use a dollar volume to working day ratio based on the original contract, corrected up or down as seems fair. A critical path diagram would give us a rational basis for this evaluation of time required.

Another use for the diagram is in estimating and scheduling construction inspection forces requirements with the objective, as always, of providing adequate inspection of the contractor's activities at the lowest possible cost. Fluctuations in numbers of inspectors needed and in requirements for different inspector skills can be better foreseen.

Use of the critical path method on a project under construction is more valuable to the contractor doing the work than to any one else, but it can serve as a useful tool for the responsible engineer in determining whether or not the contractor is on schedule, ahead, or actually behind schedule, particularly on the larger and more complicated projects.

The same procedure can be used to determine the time required for the planning stages of a project. The procedure would be simply to list all of the various things which must be done, arrange them in their logical sequence, estimate their time, and draw a diagram.

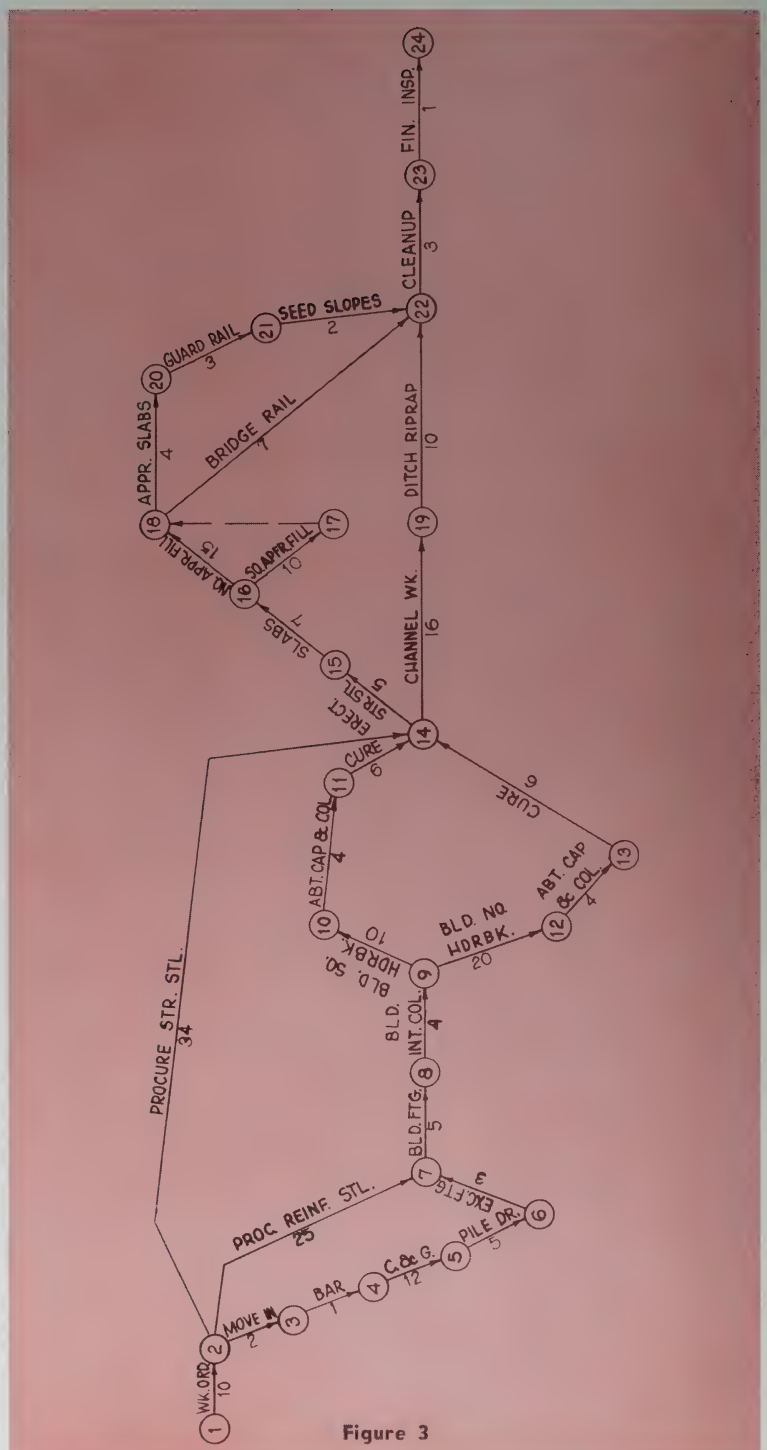

1 WK. ORD. 10
2 MOVE IN 2
3 BAR 1
4 C & G. 12
5 PILE DR. 5
6 EXC. FTG. 3
7 BLD. FTG. 5
8 BLD. INT. COL. 4
9 BLD. NO HDRBK. 20
10 BLD. SO HDRBK. 10
11 CURE 6
12 ABT. CAP & COL. 4
13 ABT. CAP & COL. 4
14 CURE 6
15 ERECT STR. STL. 5
16 SLABS 7
17 SLAPER FILL 10
18 NO APPR. FILL 15
19 CHANNEL WK. 16
20 APPR. SLABS 4
21 GUARD RAIL 3
22 SEED SLOPES 2
23 DITCH RIPRAP 10
24 CLEANUP 3
25 FIN. INSP. 1
PROCURE STR. STL. 34
PROC. REINF. STL. 25
BRIDGE RAIL 7

Figure 3

With reference to the example construction project in Figure 4, as the construction proceeds the actual time on which each event is reached will be known and substituted for the planned time. This will tell you whether or not the work is ahead or behind schedule. If it is behind schedule, the time required to do succeeding activities along the critical path must be reduced in order to complete the project on time. This is another advantage of the method. It enables anyone interested in the project to forecast time lags or trouble spots early enough to do something about it. Many times when a project is badly behind schedule, the contractor simply adds more men and equipment and works overtime on all the activities which are underway—or worse yet, he does nothing. This method can point out the particular activities which should be speeded up. This should result in a cost saving to the contractor.

Usually not more than 15 or 20 per cent of the activities comprising the project will lie on the critical path, according to those who have used the procedure.

As you can see, the simple arithmetic calculations necessary to determine the working time for each activity, its total float time and its earliest and latest starting and finish times could be very time consuming for a large project. The solutions for these simple arithmetic problems could be done by a computer. Some who have experience at it say that if the number of activities exceed 25, then the arithmetic should be handled on a computer to save time.

Some states, Indiana, for instance, place the critical path on the contract plans with instructions for the contractor to use it unless he has a better approach.

Highway construction, planning and maintenance with its literally hundreds of activities involving many separate organizations such as cities, counties, utilities and contractors would appear to be an excellent field for application of this procedure.

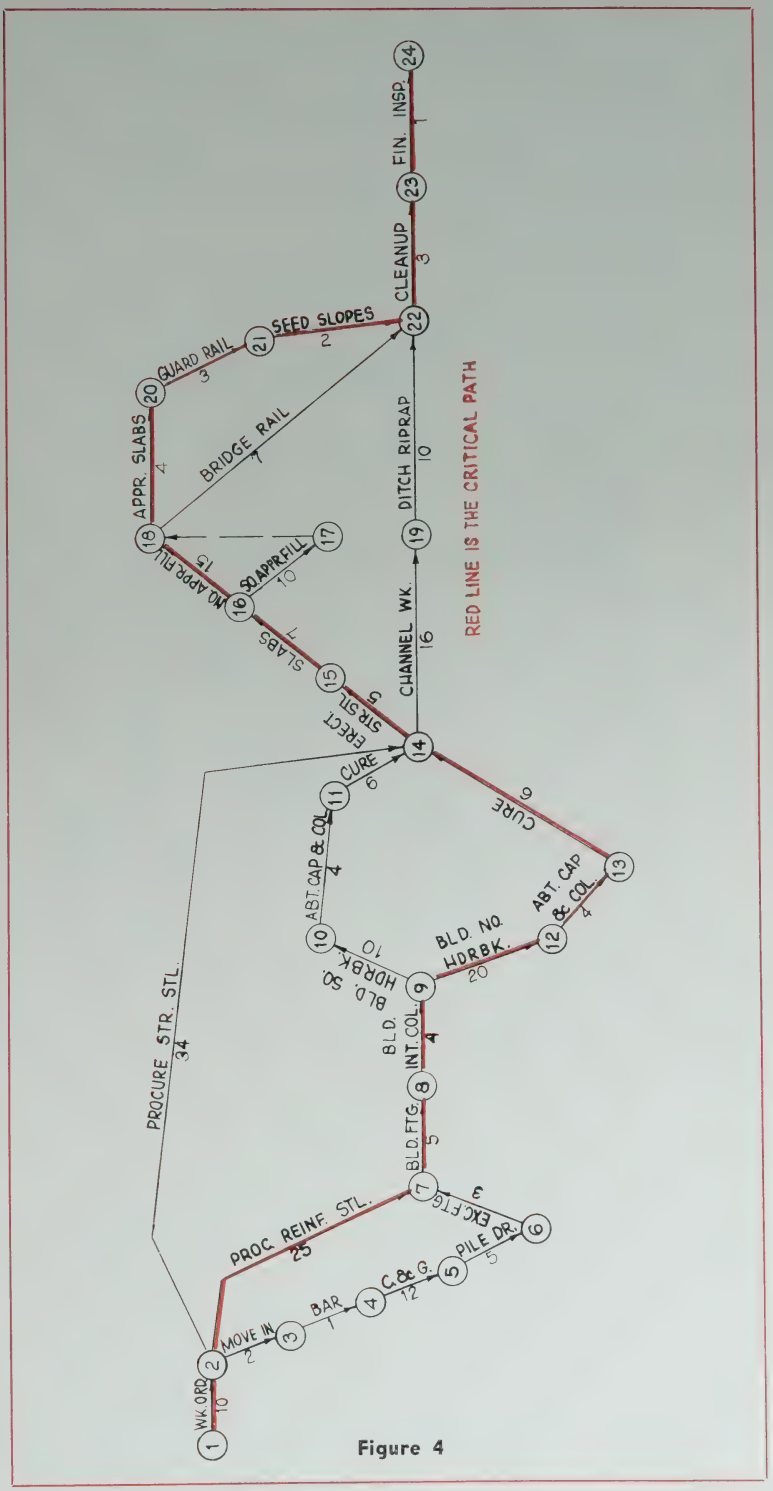
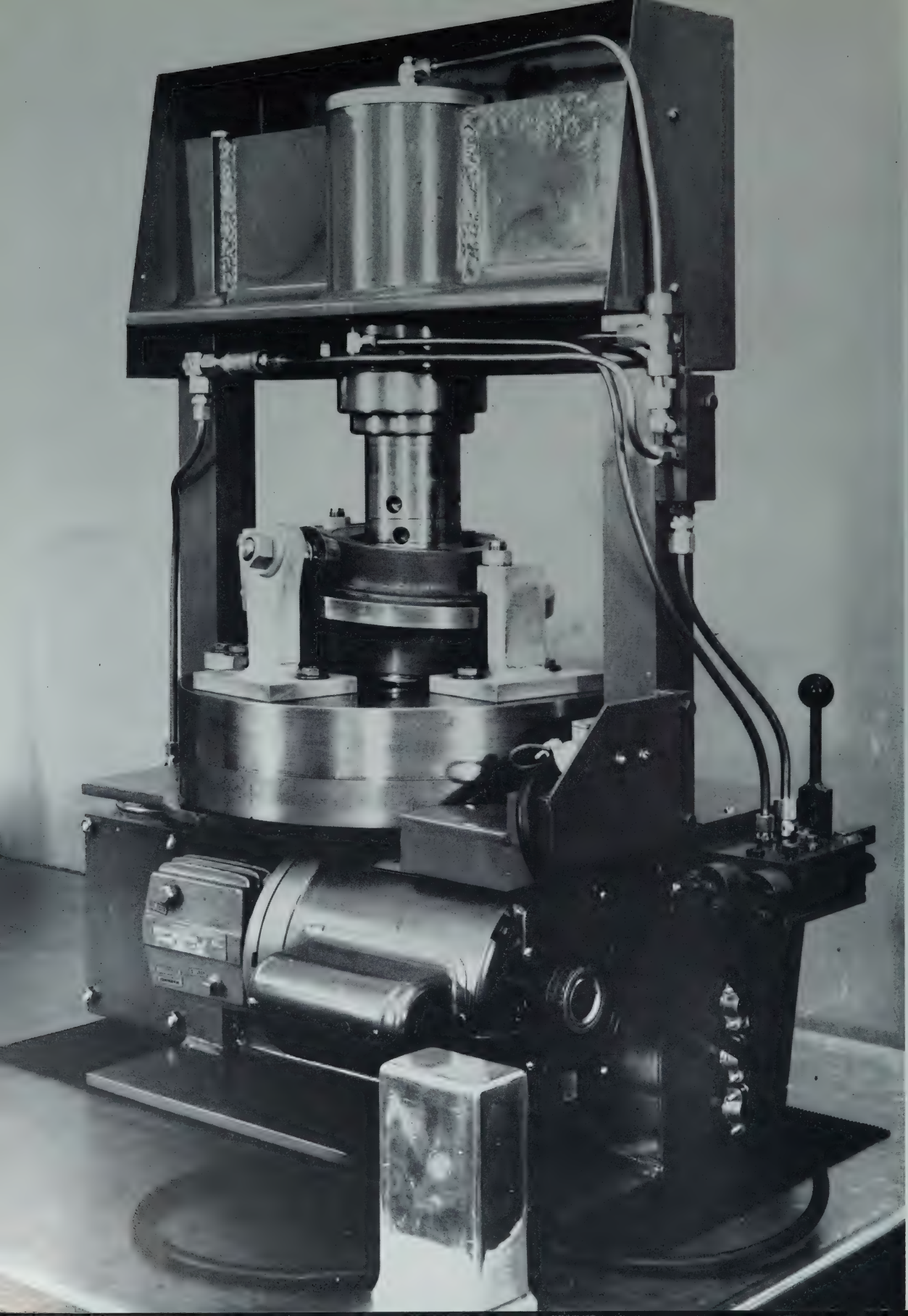


Figure 4



NEW MOULDING PRESS

A molding press that will produce more consistent asphaltic concrete test specimens as compared to the old manual method of molding has been developed by engineers in the Materials and Tests Division in Austin. The new machine is now undergoing extensive tests to prove its reliability.

Development of the new press is part of a continuing process of testing and research being carried on by the Division.

The motorized gyratory-shear press for molding test specimens promises to replace the manual method that depends on the physical prowess of the operator and "how well the guy feels at the time." Several mechanical compactors have been developed over the years by other organizations, but they are costly and will not produce the test specimens that Materials and Tests engineers feel is necessary for their test purposes.

Test specimens must be compacted properly to insure uniform test results. Specimens compacted in this manner are tested for density, stability, and sometimes cohesion in controlling plant production and in experimental work.

The new press can be built by the Department for a fraction of the cost of commercial units. Presses now used by the Department have to be bolted in place. The new press does not have to be bolted down and can be set conveniently on a work table.

The Texas Highway Department gyratory-shear method of compaction was originated by O. A. Philippi, currently Construction Administrative Engineer, Charles C. Raines, a former laboratory assistant, and Albert L. Love Jr. This original molding press and procedure was used as a tentative method from 1940 to 1946, when it became a part of the specifications in Construction Bulletin C-14. Molding presses of this design, with only slight changes in the supporting frame, are in daily use throughout the state.

Lab engineers, through extended

« A motorized gyratory-shear press, developed by engineers in the Materials and Tests Division, is now undergoing tests at Camp Hubbard. Engineers believe the new press will produce more consistent asphaltic concrete test specimens than is now possible by the manual method.

» Arthur Hill, Supervising Bituminous Engineer, watches as Robert Kriegel, Senior Bituminous Engineer, both of Materials and Tests Division, prepares a test specimen on the new press.

PAT ARHELGER—He transformed a basic sketch into a practical, working part. Machinist Arhelger worked closely with bituminous engineers to build a motorized asphaltic concrete press.

Muscles straining, Jim Morgan, Materials Analyst II, demonstrates the manual method of molding test specimens.

experimenting with the manual method, found there was often too much variation in the test specimens. With the approval of Harry Sandberg Jr., Principal Laboratory Engineer, and under the leadership of Arthur Hill, Supervising Bituminous Engineer, and Robert F. Kriegel, Senior Bituminous Engineer, basic sketches of a modified press were made.

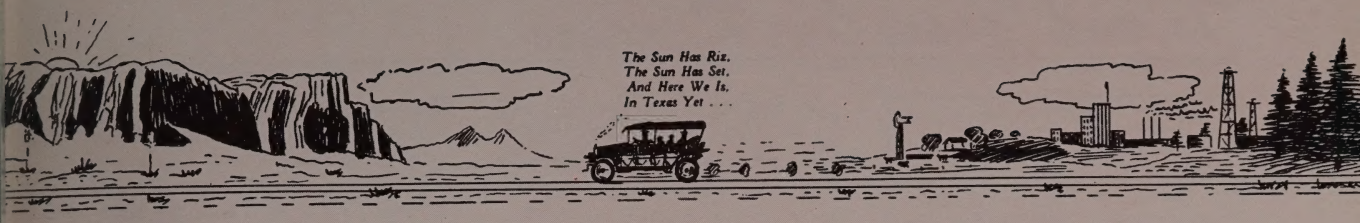
The men who made the sketches a reality were T. W. Cox, Supervisor of the machine shop of the Equipment and Procurement Division, and Richard Allen, machinist. The new machine was driven by a chain and sprocket system that replaced the manual efforts, but which still had its drawbacks. After more experimenting, the press was modified and put into service in April 1962. Further testing revealed the "motorized" unit could easily duplicate the exact molding procedure desired and could produce near identical results again and again, which is practically impossible with the curent hand-operated press.

A few months later, advanced ideas for an entirely new concept were drawn up and discussed with Cox. This new project was assigned to Pat Arhelger, machinist.

"Pat should be given full credit for his ability to take a very basic drawing and develop a practical, working part that displays such fine workmanship," Sandberg said.

The Bituminous Section will have to make numerous tests with the new unit over the next few months, and test various kinds of bituminous mixtures with all types of aggregates.

Sandberg believes their investigation will be completed by July of this year with enough data to justify adoption of the press for statewide use. Lab engineers believe the new molding press will prove a real asset in making test specimens and that it is a big step in the progress of laboratory compaction.



OVER THE HIGHWAYS

Comments . . . from the Traveling Public

• I don't know if it is proper to write to the Highway Department except to complain or not. If so, this letter is in error, as we wish to tell you how much we enjoyed driving on your roads and highways.

Every year we drive through some part of Northern Texas and like the roads. Last March we made a circuit of the state and were so very pleased with almost all of the roads, especially many that were marked as "Farm Roads." Many of your neighbors would do well to borrow them as main highways.

One of the things that appealed to us was the wild flowers along the roadside. I can not tell you their names, but they looked remarkably fresh and beautiful to us after seeing a winter of snow and ice. . . .

Phillip Watterberg
Excelsior, Minnesota

• Your roads are very nice, but there are no motel accommodations on some. The port towns and waterfronts are littered and trashy—they could look neater.

Tulsa, Oklahoma

• . . . would you be kind enough to give me some detailed information about Austin, San Antonio, Dallas, and Houston. You see, I am planning the writing of a book that will involve these towns and as I have never been out of the United Kingdom, I need information to make my story authentic. e.g., What type of weather these cities have, schools, hotels, . . . The money will also be a problem. Maybe you would be kind enough to let me have a comparison with English money. Also, the slang terms (I have heard the expression "a fin" used on TV) for various amounts.

Another thing I would have to be certain about is the type of accent I give any character in these cities. Would they have a deep southern accent or not? And does one say San Antone, or San Antonio.

I do hope that you do not consider any requests an impertinence and I would be glad to pay for any literature you are kind enough to send. Who knows, if the book is good enough I may earn sufficient to thank you in person.

Ralph L. Harris
England

• We Liked Texas — particularly your smooth wide highways, your courteous policemen, and your boundary information headquarters. We did not like the road markers in your larger cities, however.

Chester, Illinois

• Your highways are excellent, overall. I liked especially the way the majority of drivers will pull over on the paved shoulder and let other traffic pass.

Arkadelphia, Arkansas

• We enjoyed the friendly people, the scenery, and the atmosphere in general. However, the maximum speed limit should be increased in suitable areas—and the edges of highways should be marked. You also need a few more facilitated rest areas.

Los Angeles, California

• Would you please send me a map of Texas? I have seen men working on roads and like to watch them. I like to see the big graders and rollers. How is the weather in Austin? I hope you have a fine winter.

Ray Brown Jr.
La Grange

• Texas has very fine friendly folks. We have enjoyed our trip through Texas and hope to come again. Your lovely little hostess at the Orange Information bureau is tops.

L. G. Camp
Waterloo, Iowa

• We think your roadside rest areas are excellent—the best of any we have found. We think the speed limits could be raised to 65 on the divided highways. We drove 65 and all the Texas cars passed us.

San Diego, California

To and From Our Readers

The annual Short Course at Texas A & M College will not be held this spring.

Instead, the event has been scheduled for December 3, 4 and 5. It will mark the 37th year for highway engineers throughout the state to meet to discuss highway engineering progress.

◈ A Texas Highway Department man is one of 18 men throughout the country invited to present a seminar paper at the International Road Federation's annual Road Show at Chicago February 23 to March 1.

He is M. V. Greer, head of the Traffic Engineering Section of Maintenance Operations Division. The title of his paper is, "Traffic Engineering Requirements on Rural Highway."

The paper will be heard simultaneously in English, French, Spanish and German.

An estimated 75,000 persons—from the 50 states and 100 foreign countries—will view the construction equipment exposition and road show.

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◈ Percy V. Pennybacker, former Supervising Field Engineer in the Bridge Division, died February 5 in Austin. Pennybacker retired in 1957 to join a private firm in Waco, after serving the Highway Department for 23 years.

He first worked for the Department from 1919 to 1921, when he became a member of a bridge firm in Kansas City. He returned to the Bridge Division in 1936.

Pennybacker was known for his promotion of welding both inside and outside the Department. In 1953 he received the annual Dr. L. I. Hewes Award for outstanding contribution in the use of welding for the repair and construction of highway bridges.

◈ Robert J. Milligan, former Texas Highway Department District Engineer at Brownwood, died February 4 at McKinney. Before his retirement in 1960, he had been with the Highway Department for 35 years.

Milligan started to work as an Instrumentman in 1925 and came to Brownwood in 1932 when the District was first created. He held titles of Resident Engineer, Assistant District Engineer, and Acting District Engineer, becoming District Engineer in 1952.

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◈ Texas Highway Department engineers joined engineers throughout Texas and the nation to observe National Engineers Week February 17-23.

President Kennedy and Governor Connally proclaimed the week, which is traditionally held during the week

"OLD 64 FINALLY STOPPED BLEEDING."

TEXAS HIGHWAY COMMISSION

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HAL WOODWARD	Member
D. C. GREER	State Highway Engineer

Texas Highways

TEXAS HIGHWAYS, official journal of the Texas Highway Department, is published in the interest of highway development in Texas and for departmental education in the improvement of construction, maintenance, and operation.

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of George Washington's birthday since the first president himself was a noted civil and military engineer.

During the week, hundreds of Texas engineers gave talks to various civic and professional organizations emphasizing the theme, "The Place of the Engineer in Modern Industrial Development Progress." Radio and television programs, banquets and tours of engineering laboratories were among other activities.

The observance is sponsored annually by the 60,000-member National Society of Professional Engineers.

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◈ Decorating the office Christmas tree every year is one of the favorite sports of Texas Highway Department employees.

Artist Ken Collingsworth, inspired by the good-natured squabbling about where to stand the tree and what color of tinsel to use and who should decorate the tree, came up with a cartoon that depicts this state-wide sport.

The cartoon stemmed from a true-to-life episode in a Highway Department office, but Collingsworth decided not to reveal the caption. Instead he was curious to see what captions the readers of the December '62 issue of TEXAS HIGHWAYS might suggest.

Response was immediate, and the cross-section of entries gives a bit of insight to the holiday festivities of offices in all the 25 Districts. But out of 36 captions submitted for consideration, only one exactly matches the true story behind the cartoon. Written by Dee Phillips, Odessa, District 6, this caption reads: ". . . So Mr. Quimby said, 'If you can find one spot in that over-crowded office for a tree . . .' "

A panel of self-appointed humorists sorted through the entries and argued and laughed their way through a good many coffee breaks before they finally whittled the list down to eight. The winner is Bob Sanders, Right of Way Utility Agent III, Abilene, District 8, followed by seven runners-up.

Also submitting captions were: Leslie (Frank) McInroe, Mineral Wells, District 2; Estel E. Hackler, Amarillo, District 4; Roland Klar Jr., Arthur H. Yourzik, John B. Stockton, Garth C. Foutch and Charles W. Strayhorn, San Antonio, District 15; Freddie R. Green, Denton, District 18; Lahoma Bruce, Childress, District 25; and Fred Miller, Construction Division, C. A. Zaleski, Accounting Division, and John Nixon, Highway Design Division, all of Austin.

THESE ALMOST WON

1. **"It's our little space tree."**—Patti Thompson, Fort Worth, District 2.
2. **"The requisition stated a crystal chandelier."**—Mike Salinas, Corpus Christi, District 16.
3. **"Why did you open the bar before you put up the tree?"**—Right of Way Gang, Corpus Christi, District 16.
4. **"Norma suggested we put it in the corner, Georgene suggested moving the desk and put it there, Russ, here. . . ."**—Mike Salinas, Corpus Christi, District 16.
5. **"It has something to do about a thing called a plumb bob!"**—C. M. Gordon, San Antonio, District 15.
6. **"All because nobody laughed at his last three jokes."**—Herman Hudson, Austin, District 14.
7. **"I personally think it was a sneaky way to avoid putting presents under the tree."**—Betty N. Keel, Fort Worth, District 2.

No-no, the boss said **"Hang** the Christmas tree, we're going to have a real party this year!"—Bob Sanders, Abilene, District 8.

Construction picture of the month shows the rapidly rising interchange of Interstate Highway 37 and State Highway 286 in downtown Corpus Christi. SH 286, angling right center, is being built on new location through the city.

Photograph courtesy Corpus Christi Chamber of Commerce